Part No. 171.1001

CARTER-SCOTT DESIGN

CyanoFume FCC171

FORENSIC CYANOACRYLATE CABINET

FCC171-C: ductless filtered model
FCC171-D: externally ducted model

USER'S GUIDE

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PLEASE READ THIS USER GUIDE THOROUGHLY AND COMPLETE SEVERAL TEST CYCLES TO BECOME FAMILIAR WITH THE OPERATION OF THE FCC.

1. Introduction

This User's Guide outlines the features and operation of the FCC171 series of Forensic Cyanoacrylate Cabinet (referred to in this Guide as the FCC). The FCC171-C model has integral ductless fume purging. The FCC171-D model has ducted fume extraction and must be connected to an external exhaust facility.

Since the late 1970s it has been known that cyanoacrylate ester ("superglue") fumes can be used for the development of latent fingerprints on non-porous surfaces. The FCC provides a secure cabinet to safely control and accelerate this technique.

1.1 Description of the FCC

The FCC comprises a sealed aluminium cabinet with glass sides and glass door. The cabinet has two exhibit shelves and an overhead lamp. A control box sits above the cabinet, and a heater unit sits below. The operation of the FCC is under microprocessor control with an interactive display giving clear user prompts.

The heater unit operates at low voltage and is under closed-loop temperature control to provide optimum cyanoacrylate evaporation. The heater temperature is factory set to be always safely less than the temperature (approximately 210ºC) at which cyanide fumes may develop. There are separate low voltage fans for fume circulation (gentle) and for fume extraction (high flow).

Various safety interlocks are monitored by the microprocessor, so as to reduce the possibility of inadvertent exposure of the user to irritating fumes. For example the FCC will not function if the cabinet door is left ajar. The control also monitors for system malfunction, such as a jammed vent flap, in which case the operation is frozen and the user informed via the interactive display.

Technical specifications are listed in Appendix A.

1.2 Safety Notes

Cyanoacrylate ('superglue") is a strong irritant to eyes, and the respiratory tract, and it bonds to skin. The FCC has been designed to reduce as much as is practicable the possibility of any accidental contact. However if superglue does splash into the eyes, they must be immediately flooded with copious quantities of water, and medical attention sought. If superglue bonds to the skin it may be removed with acetone.

The heater can become very hot so do not attempt to access the heater until the Exhaust/Purge phase is complete.

1.3 Using the Cyanoacrylate Fuming Process to Develop Latent Fingerprints

The cyanoacrylate vapour produced during the fuming process reacts with greasy or moist latent fingerprint ridges to form a hard white polymer. The rate of cyanoacrylate development depends on the type and age of fingerprints, environmental exposure of the exhibit, contamination, and the nature of the surface bearing the latent fingerprints. The polymer will also appear on the 'background' surface as well, although, in most cases, at a much slower rate. Consequently the cyanoacrylate development should be monitored to obtain good ridge detail and to avoid overdevelopment which occurs when all the surface is covered with cyanoacrylate polymer. As soon as background development is noticed, the exposure to cyanoacrylate vapour should be stopped.

1.4 Effect of Humidity on Cyanoacrylate Fuming

Experience has shown that the common practice of increasing humidity during fuming tends to compromise print clarity by increasing overdevelopment and creating extra irrelevant details on prints. The FCC has been designed without a humiditiy function to reduce the probability of compromising print clarity.

1.5 Cleaning Cyanoacrylate Residues from Cabinet Interior

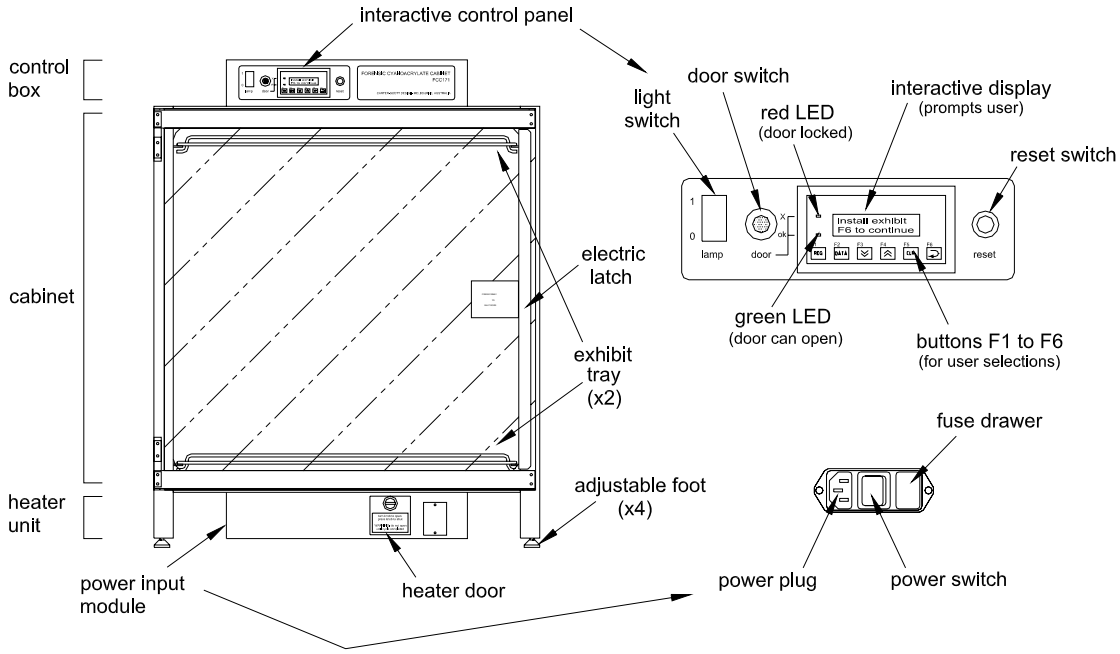
As a normal result of the fuming process over time, cyanoacrylate residues will gradually build up on the interior surfaces of the FCC. Residue buildup will be accelerated on any surfaces that have been touched by bare hands.

Keep the cabinet interior clean to improve both the efficiency and the effectiveness of the fuming process.

To clean glass surfaces:
1. Spray the cyanoacrylate residue with an all-purpose non-abrasive household cleaner that has ammonium hydroxide as its active ingredient.
2. Wipe the sprayed area using a paper towel. The cyanoacrylate residue will flake off.
3. Lightly spray the surface again with cleaner and wipe away any remaining cyanoacrylate residue.
4. Throughly wipe the surface with methylated spirits (alcohol).

To clean trays and other metal surfaces, wipe with acetone using a paper towel.

Main Components of the FCC



2. Operation

2.1 Initial Setup

Uncrate the FCC and place on a bench or table. If the bench is not level and flat then adjust the four feet so the FCC stands securely. Remove the strap securing the door and release the door latch. The two exhibit trays are packed external to the cabinet[1]. (See Appendix D for information on the optional AS71 Accessory Stand.)

Plug the electric cord into power input module on heater unit, connect to mains power and turn on switch beside plug in heater unit.
The FCC will check its status. Display shows 'STATUS CHECK PLEASE WAIT'.
Then the green LED on the interactive display will light up to indicate that the door switch is enabled.

Open the cabinet door.
Press the door switch (on the control panel) with one hand
while using the other hand to press very firmly against the door latch.
When the latch release click is heard, pull the door open.

Close the cabinet door.
Press the door latch very firmly until the latch lock click is heard. Do not slam the door shut.

[1] some FFC units may be supplied with an optional third tray

Set up fume exhaust.
FCC171-D Ducted Model: connect the exhaust outlet tube to a suitable external vent.
The outlet tube is at the top rear and accommodates 76mm inside diameter flexible ducting.
If external suction is applied then the duct connection must be loose to allow fresh air
from the room to be taken in as well. Avoid strong suction from the external exhaust
as this may disrupt proper FCC operation.

FCC171-C Filter Model: remove the filter assembly from inside the cabinet, as described in Section 3.3, and add an initial charge of granulated charcoal. The first charge of granulated charcoal is packed in a plastic bag inside the filter assembly.

Clean cabinet interior and exhibit trays before first use.
Wearing gloves, wipe clean with methylated spirits (alcohol) all interior surfaces of the fuming cabinet. Thereafter avoid touching the interior of the FCC or the exhibit trays with bare hands as this will cause depletion of cyanoacrylate fumes and produce a build-up of solid cyanoacrylate on inner surfaces.

Install the exhibit trays.
Ensure that trays are correctly positioned with runner grooves down and placed at back of cabinet.

2.2. Operating Cycle Overview

The FCC171 operating cycle consists of three sequential phases:
1. Evaporation 2. Fuming 3. Exhaust/purge.

Throughout the operating cycle the control panel displays information about the operating phase and provides instructions and options for the user. All user selections are made by pressing the appropriate function display buttons labeled F1 to F6.

During the operating cycle the red LED, on the control panel interactive display, lights up to indicate that the door switch is disabled and the door cannot be opened. The door can be opened only when the green LED lights up.

Evaporation Phase
The **Evaporation** phase time is fixed at 8 minutes. If the FCC is interrupted after evaporation has commenced (eg: by a power failure) it will automatically default to a full 20 minute exhaust/purge when restarted. This default cannot be bypassed by the user.

Fuming Phase
Times for the **Fuming** phase can range from 1 minute to 16 hours (960 minutes).

There are six program options for Fuming duration: the first option allows the user to select from a range of fuming times. The remaining five pre-set options have been selected on the basis that they have consistently provided high quality results with particular types of exhibits. Refer to Table of Fuming Time Selections below.

At any time during Fuming the user can choose the 'Escape' display option to terminate Fuming and divert to the Exhaust/purge phase.

Where repeat fuming is allowed, a short beep repeats for 60 seconds at the end of Fuming. To keep on fuming (at twice the previous duration) the user must choose the 'Double Fume' option during those 60 seconds.

Alternatively the user can press the 'Finish' option at any time during the 60 seconds of beeping to divert to the Exhaust/purge phase.

The beeping stops as soon as either button is pressed. If no buttons are pressed during the 60 seconds of beeping then the Exhaust/purge phase automatically activates.

Exhaust/Purge Phase
The **Exhaust/purge** phase is fixed at 20 minutes and cannot be shortened.

2.3 Operating Procedure

Gather supplies needed:

- Cyanoacrylate: Loctite 406 is recommended, or an equivalent cyanoacrylate with a viscosity of 20mPa.s
- Press-tool (supplied) and aluminium 'kitchen' foil to make disposable cyanoacrylate container.

1) Switch on the unit and external extractor (FCC171D)
Turn on the mains switch and wait for the status check to finish.
Display shows 'INSTALL EXHIBIT F6 TO CONTINUE'.

2) Load exhibits into the cabinet.
Warning! ***Do not put wet or oily exhibits in the cabinet.***
Wet exhibits must be dried at room temperature first.
Oily exhibits will contaminate the cabinet.
Press the door switch (on control panel) with left hand and pull the door open with right hand.
Load exhibits, spacing them throughout the cabinet.
In the case of a large bag, squash the bag slightly so it can fit into the cabinet.
Large firearms can be fitted diagonally in the cabinet.
When all exhibits are loaded, push firmly against the door latch to close it.

3) Decide on the fuming time.
Select the appropriate fuming time according to the state of your exhibits.

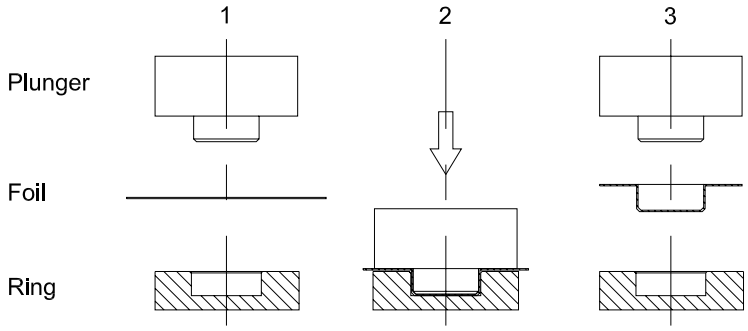
- Fresh exhibits, less than 24 hours old, generally require only a short fuming time e.g. 5 minutes.
- Fingerprints on polymer banknotes are shortlived (e.g. one week) so they need to be processed with cyanoacrylate as soon as possible. Optimum exposure is 1.5 hours.
- Exhibits that have been exposed to dust or have been environmentally exposed (e.g. to rain, water, sun, dry heat) should be fumed two to three times longer than clean, unexposed exhibits.
- Guns, in general, require very long development (at least several hours).

In general, a system of 'doubling' the previous fuming time is recommended so that progress with print development can be regularly checked and the fuming process stopped as soon as background development is noticed. If no useful fingerprint detail has resulted and no background development is evident, the exhibit should be exposed to a further period of fuming.

FUMING TIME SELECTION TABLE

option	name	description	initial fume time	fume repeat at twice previous interval
User	user	operator selects from nine fixed durations	select from: 1, 2, 5, 10, 30min, 1, 2, 5, 8 hr	repeats = 7, for 1, 2, 5 min initial repeats = 5, for 10 & 30 min initial repeats = 1, for 1, 2, 5, 8 hr initial
Preset	fresh	for exhibits less than 24 hr old	5 min	repeats = 7 (10, 20, 40, 80, 160, 320, 640min)
	bknote	for polymer banknotes	1.5 hr	repeats = 0
	wet	for exhibits exposed to water or rain	3 hr	repeats = 2 (6 hr, 12 hr)
	dry	for exhibits exposed to dry heat, sun, etc	4 hr	repeats = 2 (8 hr, 16 hr)
	dust	for exhibits exposed to dust (eg: plastic bags used for drug powder)	4 hr	repeats = 0

4) Prepare a cyanoacrylate evaporation container. Use the press-tool (supplied) to make an aluminium foil container for the hotplate in the heater unit.



a. Cut aluminium foil[2] to about 75mm square.
b. Place the foil over the Ring and press the Plunger fully in.
c. Trim away any excess foil (to same diameter as the press-tool).
d. Withdraw the Plunger, keeping the newly made container snug on the plunger.
e. Place a small amount of heat conducting paste on the bottom of the container

5) Start the cycle. Press F6 display button and follow display prompts to select desired fuming time.

6) Charge with Cyanoacrylate. Display shows 'CHARGE HEATER F6 TO CONTINUE'
Unlock the heater unit door (under the cabinet)
by turning the knob clockwise, then gently pull the evaporation unit outwards.
Warning! Never place cyanoacrylate directly on the evaporation hotplate. Cyanoacrylate residue on the hotplate will prevent good thermal contact with the foil liner and result in poor cyanoacrylate evaporation and thus hamper good fingerprint development.
Place a pre-made aluminium container in the hotplate recess ensuring the heat conducting paste on the container is in good contact with the hotplate.
Charge the container with 12-20 drops of cyanoacrylate depending on exhibits load.
Gently push the evaporation unit in, then firmly press the knob to secure the heater door.

Note: there is a spring resistance on the final 25mm of evaporation unit travel.

7) Start the Evaporation Phase. Display shows: 'SHUT DOOR & HEATER F6 TO START EVAP'.
The FCC will automatically sequence through Evaporation>Fuming>Exhaust/Purge.

8) Monitor the state of fingerprint development during the Fuming phase.
The light may be switched on, during the fuming phase, for inspection purposes only.
Warning: Leaving the light on permanently is not recommended as this may interfere with fingerprint development.
If strong development is evident, or if any sign of background development occurs, then follow the 'Escape' prompt to finish the phase.
If development is not adequate then double the fuming time (if allowed).
The FCC will automatically start the Exhaust phase (20 minutes) when fuming is completed.
The door cannot be opened until the Exhaust phase has completely finished.
Display shows: 'OPEN DOOR REMOVE EXHIBIT'.
When the door is opened, display shows "CYCLE COMPLETED PRESS RESET".

9)Set up for the next cycle.
Press-hold the 'Reset' button for several seconds.
This will interrupt power to the controller and reset it.

[2] use aluminium "kitchen" foil or similar.

3. Routine Maintenance

3.1 Lamp Replacement

-Unplug the unit from mains power.
-Remove the control box from the top of the cabinet (nine screws inside cabinet roof).
-Replace the faulty lamp with a dichroic bulb GU5.3, 50W, 12V, wide flood.
-Reassemble the control box.

3.2 Fuses

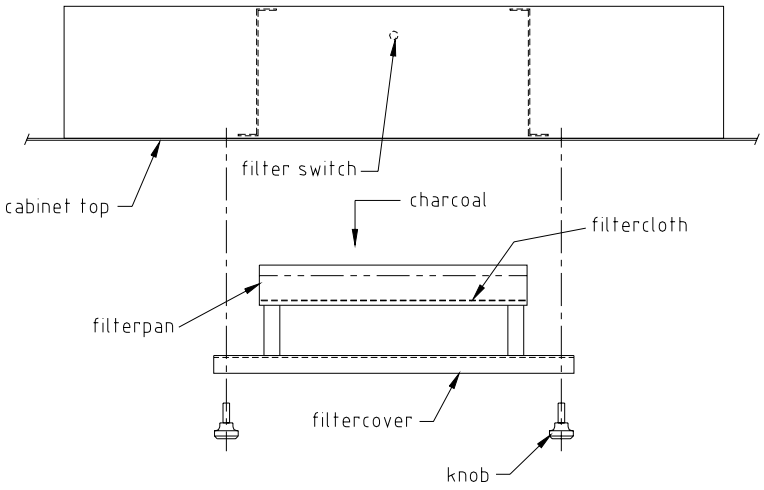
Dual 5A slo-blo fuses are housed in a fuse drawer in the mains power input module.

3.3 Filter Service (FCC171-C model only)

The filter in the FCC171C model requires servicing every 75 cycles. After 50 cycles the display will warn for filter service at the start of each subsequent cycle. Display shows: 'FILTER WARNING F6 TO CONTINUE'. The operation is frozen at 75 cycles. Display then shows: 'SERVICE FILTER OPERATION HALTED'. The filter should now be serviced.

Service the filter as follows:

1) Leave mains power on during filter service procedure.
2) Open cabinet door.
3) Remove upper tray from cabinet.
4) Unscrew the four knobs that hold the filtercover to the cabinet top; support the filtercover while the knobs are removed.
5) Carefully withdraw the filter assembly from the filter cavity; take care to keep the filter assembly level so that charcoal does not spill from the filterpan.
6) Discard the used charcoal from the filterpan.
7) Remove the filtercloth from the filterpan and clear any charcoal debris from it.
8) Remove any charcoal debris from the filter assembly.
9) Replace the filtercloth into the filterpan.



10) Measure out 0.75 litre of Granular Activated Charcoal using a graduated container[3].
11) Add the charcoal to the filterpan; spread it out evenly.
12) Press the filter switch (to reset the filter warning cycle counter). The switch is located on the rear wall of the filter cavity inside the cabinet. Mains power must be on, and 'SERVICE FILTER OPERATION HALTED' displayed, for the filter reset to function.
13) Inspect the two foam seal strips inside the filter cavity. The foam must be in good condition for the fume purge to function correctly.
14) Refit the filter assembly in the reverse of 5) and 4) above; take care to avoid damaging the foam seals, and ensure the four knobs are fully secured.
15) Refit the upper tray to the cabinet.

[3] use Granular Activated Charcoal with a particle size of 1mm or greater, and a 0.26 nominal relative density. Available from Laboratory Supply companies.

4. Faults or Malfunctions

The FCC is modular in construction, so the correction of mechanical or electronic faults usually entails the replacement or adjustment of the appropriate sub-assembly. Only qualified personnel should attempt to repair the instrument, otherwise it is recommended that a faulty module be returned to the distributor or manufacturer for repair.

The heater temperature is factory set but can be adjusted by authorized service personnel. The adjustment is accessed through an opening beside the heater door. This opening is fastened with security screws to hinder unauthorized access.

A thermal switch protects the heater[4]. This switch trips at approximately 200ºC, and auto-resets at approximately 160ºC. It is accessed by removing the shroud that is secured to the hotplate with security screws. This procedure should only be undertaken by authorized service personnel.

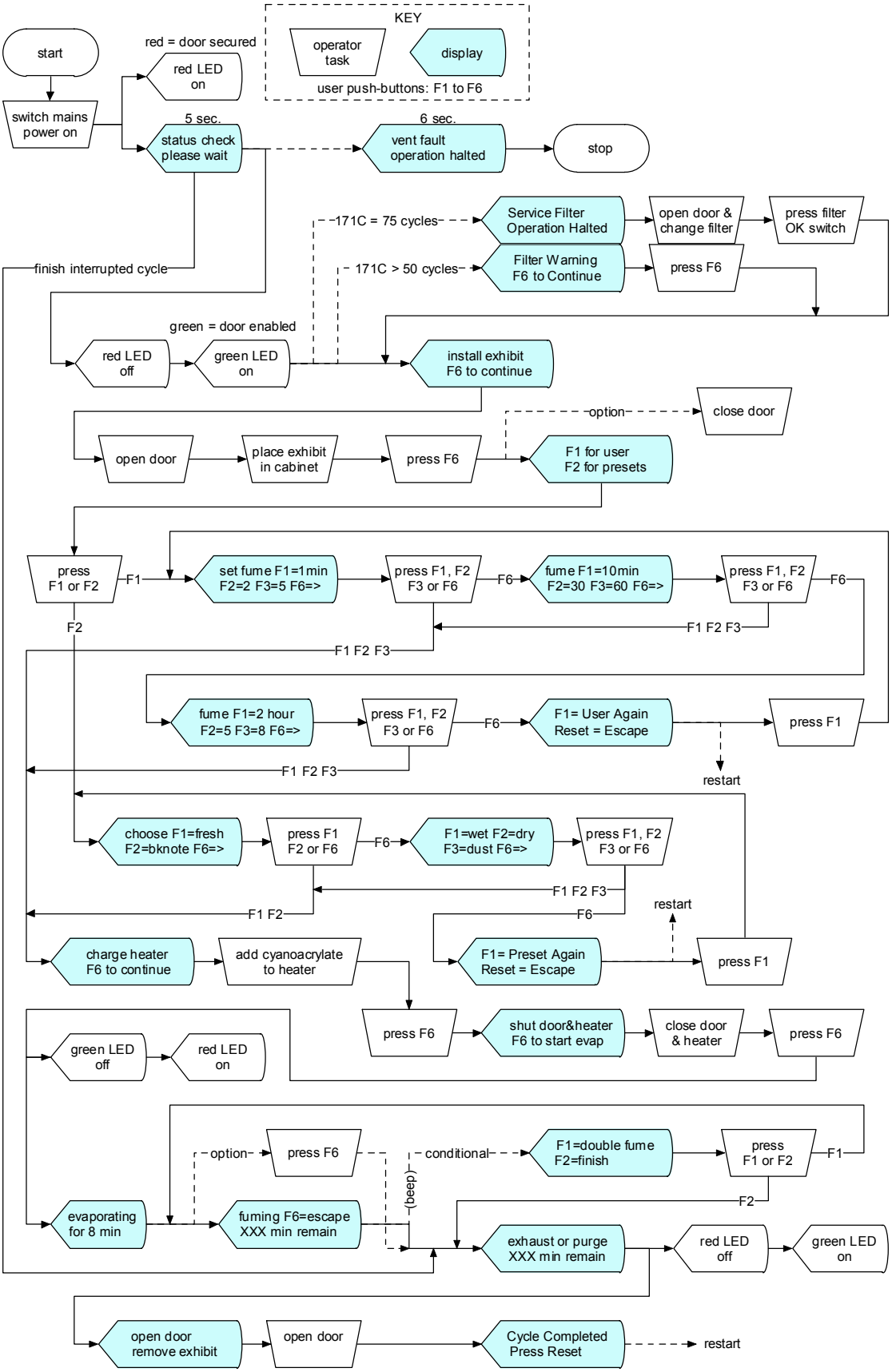
A repair manual for suitably qualified personnel can be obtained from Carter-Scott Design.

[4] thermal fuse (228ºC) fitted up to S/No.1080

Appendix A: Technical Specifications

Operational phases	1. Evaporative phase, fixed in duration at 8 minutes, then automatically proceeds to Fuming phase. 2. Fuming phase has a time range of 1 minute to 16 hours, can be extended or terminated, and automatically proceeds to Exhaust/Purge phase. User can also select from a menu of five pre-set fuming options that provide high quality results with particular types of exhibits e.g. exhibits that are fresh or exhibits that have been exposed to dry rather than wet environmental conditions. 3. Exhaust/Purge phase is fixed in duration at 20 minutes and performs ten complete air changes of cabinet.
Power supply	240VAC/50Hz or 110VZC/60Hz, 300VA
Displays	Interactive 32 character alphanumeric LCD with six function buttons Red LED to indicate cabinet door is locked during operation. Green LED to indicate cabinet door can be opened.
Internal air circulation	Fan assisted
Additional safety features	Cabinet remains locked throughout operation until exhaust is complete. Alarm sounds if heater drawer is accessed during operation. Thermal switch stops heater if temperature exceeds the safe maximum.
FCC171D: Externally ducted exhaust	Outlet accommodates 76mm inside diameter flexible ducting
FCC171C: Integral ductless fume purging with filter	Activated carbon filter, replaceable Electronic prompt for servicing after 50 cycles Operation frozen if not serviced after 75 cycles
Cabinet	
Internal dimensions	780W x 640D x780H mm (30.5W x 25D x 30.5H inches) Diagonal=1275mm (50 inches) Volume= 0.39m^3 (13.8 cu.ft)
External dimensions/weight	800W x 690D x 1010H mm (31.5W x 27D x 39.5H inches) 55kg
Shipping crate dimensions/weight	990W x 850D x 1200H mm (39W x 33.5D x 47H inches) 105kg
Accessory Stand,AS71	
Dimensions	800W x 650D x 750H mm (31.5W x 25.5D x 29.5H inches)
Construction	Anodised aluminium, open frame

Appendix B: Flowchart Illustrating the Control Structure of the FCC



APPENDIX C: Warranty

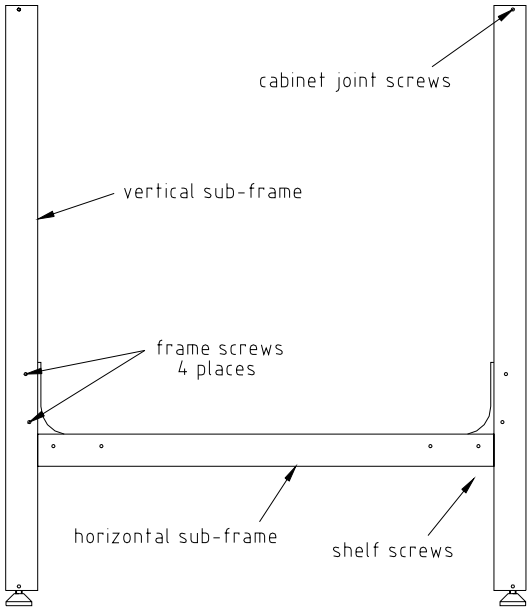
Carter-Scott Design warrants this product to be free from any defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which, under normal use, and service disclose such defect, provided the unit is delivered to our factory intact for our examination with all the transportation charges prepaid, within one (1) year from the date of delivery to the purchaser, and providing that such an examination discloses in our judgment that it is thus defective.

This warranty does not extend to any of our products which have been subjected to misuse, neglect, accident, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside our factory, nor to units used with accessories not manufactured or recommended by us.

This warranty is in lieu of all other warranties or liabilities and Carter-Scott Design makes no other warranty, expressed or implied. In no event will Carter-Scott Design be liable for consequential or resulting loss or damage, whether or not due to causes covered by this warranty.

APPENDIX D: Accessory Stand, AS71, Assembly

The optional AS71 Accessory Stand comes dismantled as three sub-frames.



The illustration depicts an assembled AS71 Stand in side-view.

Assemble the AS71 as follows:

- Bolt the *shelf* of the horizontal sub-frame to the two vertical sub-frames; use four M4x16 screws & nuts supplied with the Stand, "shelf screws" in illustration.
- Bolt the *brackets* of horizontal sub-frame to the two vertical sub-frames; use eight M4x16 screws & hexnuts supplied with the Stand, "frame screws" in illustration.
- Place the FCC171 Cabinet on top of the Stand so that the four legs of the Cabinet engage with the vertical sub-frames.
- Bolt the Stand to the Cabinet; use eight M4x10 screws & spring-washers supplied with the Stand, "cabinet joint screws" in illustration.
- Adjust the four feet on the Stand so the FCC sits securely.